MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PSM0325 – INTRODUCTION TO PROBABILITY AND STATISTICS

(Foundation in Information Technology / Life Sciences)

2 MARCH 2016
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **THREE** printed pages including the cover page.
2. Answer **FIVE** out of **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. **Statistical table** is provided.

Instruction: Answer **FIVE** out of **SIX** questions.

Question 1 (10 marks)

The probability function of a discrete random variable X is given by:

x	1	2	3	4
$p(x)$	$3k$	0.29	0.23	k

a. Find the value of the constant k. (2 marks)
b. Find the probability that X is greater than 2. (1 mark)
c. Find the mean and variance of X. (5 marks)
d. Determine the cumulative distribution function of X. (2 marks)

Question 2 (10 marks)

The probability density function of a random variable X is given below:

$$f(x)=\begin{cases}\frac{2}{9}(x^2-x); & 0<x<3\\ 0; & \textit{otherwise}\end{cases}$$

a. Find the probability that X is between 1.5 and 2.5. (3 marks)
b. Calculate the mean and variance of X. (7 marks)

Question 3 (10 marks)

In a qualifying test, 35% of the contestants took more than 2 hours to complete the test. A random sample of 18 contestants is selected. Find the probability that

a. less than 5 contestants will take more than 2 hours to complete the test. (2 marks)
b. at least 10 contestants will take more than 2 hours to complete the test. (3 marks)
c. 10 of the contestants will take at most 2 hours to complete the test. (3 marks)
d. at least 8 of the contestants will take at most 2 hours to complete the test. (2 marks)

Continued ...

Question 4 (10 marks)

The time taken by a group of contestants to complete a test run is normally distributed with a mean of 30 minutes and a standard deviation of 2 minutes.

a. If a contestant is randomly selected, find the probability that

i. the contestant will take between 25 minutes and 32 minutes to complete the test run. (4 marks)

ii. the contestant will take more than 28 minutes to complete the test run. (3 marks)

b. The contestants are disqualified if the time taken to complete the test run exceeds a certain time limit. Find the time limit if only 10% of the contestants are disqualified. (3 marks)

Question 5 (10 marks)

The mean length of a wooden stick is found to be 120 cm with a standard deviation of 18 cm. In a random sample of 40 wooden sticks, find the probability that the mean length of the sticks will be:

a. between 118 cm and 128 cm. (4 marks)

b. within 5 cm of the population mean. (4 marks)

c. more than the population mean by at least 4cm. (2 marks)

Question 6 (10 marks)

A lecturer claims that his students spent at least an average of 2 hours daily to prepare for his lectures. To test the claim, a random sample of 50 students who have registered for the lecturer's subject were interviewed. Based on the responses from the 50 students, it was found that the students spent an average of 2.9 hours daily to prepare for the lectures with a standard deviation of 0.5 hours.

a. Based on the results of the 50 students, construct a 99% confidence interval for the average number of hours spent daily to prepare for the lecturers. (4 marks)

b. At the 0.05 level of significance, is there evidence to support the lecturer's claim? (6 marks)

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